UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P O Box 1450
Alexandria, Virginia 22313-1450
www uspto gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/594,083	09/25/2006	Saimon Otaka	101790.58258US	8070

23911 7590 05/12/2010

CROWELL & MORING LLP
INTELLECTUAL PROPERTY GROUP
P.O. BOX 14300
WASHINGTON, DC 20044-4300

EXAMINER	
CHEUNG, MANKO	

ART UNIT	PAPER NUMBER
2863	

MAIL DATE	DELIVERY MODE
05/12/2010	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/594,083	OTAKA ET AL.	
	Examiner	Art Unit	
	Manko Cheung	2863	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 March 2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *17-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *17-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *25 September 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Inventorship

1. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Continued Examination Under 37 CFR 1.114

2. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 03/04/2010 has been entered.

Claim Rejections - 35 USC § 103

3. Claims 17-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kowatari et al. (U.S. Patent No. 6,101,456; hereinafter Kowatari) in view of Collins et al. (U.S. Patent No. 6,671,641; hereinafter Collins).

Regarding claims 17 and 21, Kowatari teaches a displacement control method and displacement control device, comprising:

1) a calculating step of calculating a displacement control signal for driving a proportional electromagnetic valve based on a displacement command *(Kowatari, column 9, lines 26-35 and figure 1; i is the displacement control signal, element 3 of figure 1 is the proportional electromagnetic valve; column 10, lines 34-40, 52-54 and see also figure 6 and 7, the tilting θ is the displacement command indirectly related to displacement control signal i)*; and

2) an adjusting step of adjusting a displacement angle of a hydraulic device by driving the proportional electromagnetic valve with the displacement control signal calculated in the calculating step, and applying a displacement control pressure generated from the proportional electromagnetic valve to a displacement adjusting device *(Kowatari, column 9, lines 26-35 and figure 1, column 10, lines 9-10 and figure 2; hydraulic pump 1 is the hydraulic device driven by proportional electromagnetic valve 3 with signal I, command pressure P is the displacement control pressure; regulator 2 is the displacement adjusting device)*, and

3) <u>a judging step of judging whether a learning control mode is selected or a normal control mode is selected</u> ***(Kowatari, column 11, lines 23-38, see figure 9, step 52 is the judging step)*****, wherein**

3a) the displacement control signal is calculated in the calculating step based on the required displacement control pressure *(Kowatari, column 10, lines 9-10 and figure 2; the command pressure P axis of figure 2 is the required displacement control pressure; see also figure 7)*,

3b) the required displacement control pressure being based on a reference characteristic representing a relationship between a required displacement control pressure required to provide a displacement angle corresponding to a displacement command and a required displacement control signal required for the proportional electromagnetic valve to generate the required displacement control pressure *(Kowatari, column 10, lines 54-58, figure 6 and 7 shows the reference characteristic)*.

However, Kowatari fails to disclose the calculating step further <u>comprises when the learning control mode is selected</u>:

4) calculating based on the reference characteristic a minimum-side displacement control pressure corresponding to a minimum-side displacement control signal required to achieve a minimum-side displacement that is set in advance for learning and calculating a maximum-side displacement control pressure corresponding to a maximum-side displacement control signal required to achieve a maximum-side displacement that is set in advance for learning.

5) detecting a pressure generated from the proportional electromagnetic valve when the proportional electromagnetic valve is driven with the minimum-side displacement control signal as a first measured pressure,

6) detecting a pressure generated from the proportional electromagnetic valve when the proportional electromagnetic valve is driven with the maximum-side displacement control signal as a second measured pressure,

7) calculating as learned values a first difference between the minimum-side displacement control pressure and the first measured pressure, and a second difference between the maximum-side displacement control pressure and the second measured pressure,

<u>the calculating step further comprises when the normal control mode is selected</u>:

8) in response to an operator-generated displacement command, calculating a correction amount based on the first and second differences and the operator generated displacement command,

9) correcting a required displacement control pressure required to provide a displacement angle corresponding to the operator-generated displacement command with the correction amount; and calculating the displacement control signal based on the corrected required displacement control pressure with reference to the reference characteristic.

Collins et al. discloses a method for calibrating hydraulic actuator with the calculating step comprising:

4) calculating based on the reference characteristic a minimum-side displacement control pressure corresponding to a minimum-side displacement control signal required to achieve a minimum-side displacement that is set in advance for learning and calculating a maximum-side displacement control pressure corresponding to a maximum-side displacement control signal required to achieve a maximum-side displacement that is set in advance for learning *(Collins, column 3, lines 17-40, column 4, lines 29-31 and table 1; [93.33 psi] is the minimum-side displacement control pressure, [0.000A] is the minimum-side displacement control signal, [84.88 psi] is the maximum-side displacement control pressure, [0.400A] is the maximum-side displacement control signal, lookup table 1 is for learning; NOTE: the lookup table 1 is perform in actuator test stand 12).*

5) detecting a pressure generated from the proportional electromagnetic valve when the proportional electromagnetic valve is driven with the minimum-side displacement control signal as a first measured pressure *(Collins, column 4, lines 53-65; the actuator 14 being measured is the proportional electromagnetic valve, e.g., [93.33 psi] is the pressure generated with the minimum-side displacement control signal, e.g., [93.33 psi] is the first measured pressure; NOTE: the detected first measured pressure is perform in module assembly 26 [see column 4, lines 53-54], 93.33 is just an example arbitrary pressure that corresponds to the minimum-side displacement control signal that is applied to the module assembly 26 [see column 4, lines 55-58]; see also column 2, lines 4-11)*

6) detecting a pressure generated from the proportional electromagnetic valve when the proportional electromagnetic valve is driven with the maximum-side displacement control signal as a second measured pressure *(Collins, column 4, lines 53-65; the actuator 14 being measured is the proportional electromagnetic valve, e.g., [84.88 psi] is the pressure generated with the maximum-side displacement control signal, e.g., [84.88 psi] is the second measured pressure; NOTE: the detected second measured pressure is perform in module assembly 26 [see column 4, lines 53-54], 84.88 is just an example arbitrary pressure that corresponds to the maximum-side displacement control signal that is applied to the module assembly 26 [see column 4, 55-58]; see also column 2, lines 4-11)*

7) calculating as learned values a first difference between the minimum-side displacement control pressure and the first measured pressure, and a second difference between the maximum-side displacement control pressure and the second measured pressure *(Collins, column 4, lines 58-61; the +/-0.1 is the learn value; the first and second difference is determined in step 62)*

The examiner acknowledges that the invention taught by Collins is not directed to an electromagnetic proportional valve. It's only Collins' calibration method being used as a generic teaching of a well known calibration method; as such, Collins' calibration method could be used in any device, e.g., electromagnetic proportional valve.

As such, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to use the calibration method as taught by Collins <u>when the learning control mode is selected</u> such that the tolerance of the module assemblies

(the Hydraulic pump control system of Kowatari) are reduced and the performance is increased *(Collins, column 5, lines 14-18))*.

Collins also discloses

8) in response to an operator-generated displacement command, calculating a correction amount based on the first and second differences and the operator generated displacement command *(Collins, column 4, line 66 to column 5, line 6; the first and second differences is determined in step 62, and the correction amount is inherently calculated before the actuator is adjusted within the specific windows)*,

9) correcting a required displacement control pressure required to provide a displacement angle corresponding to the operator-generated displacement command with the correction amount; and calculating the displacement control signal based on the corrected required displacement control pressure with reference to the reference characteristic. *(Collins, column 4, line 66 to column 5, line 6; the specified windows is the required displacement control pressure, adjusted means correcting)*.

The examiner acknowledges that the invention taught by Collins is not directed to an electromagnetic proportional valve. It's only Collins' calibration method being used as a generic teaching of a well known calibration method; as such, Collins' calibration method could be used in any device, e.g., electromagnetic proportional valve.

As such, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to use the calibration method as taught by Collins <u>when the normal control mode is selected</u> such that the tolerance of the module assemblies

(the Hydraulic pump control system of Kowatari) are reduced and the performance is increased *(Collins, column 5, lines 14-18))*.

Regarding claims 18 and 22, as stated above, Kowatari teaches a displacement control method and displacement control device, comprising:

1) a calculating step of calculating a displacement control signal for driving a proportional electromagnetic valve based on a displacement command; and

2) an adjusting step of adjusting a displacement angle of a hydraulic device by driving the proportional electromagnetic valve with the displacement control signal calculated in the calculating step, and applying a displacement control pressure generated from the proportional electromagnetic valve to a displacement adjusting device; <u>and</u>

3) <u>a judging step of judging whether a learning control mode is selected or a normal control mode is selected, wherein</u>

3a, b) the displacement control signal is calculated in the calculating step, based on the displacement command, referring to a reference characteristic representing a relationship between the displacement command and a required displacement control signal required for the proportional electromagnetic valve to generate a required displacement control pressure required to provide a displacement angle corresponding to the displacement command,

Kowatari further teaches the calculating step further comprises <u>when the learning control mode is selected</u>

4) calculating a minimum-displacement-side control signal used for learning and a maximum-displacement-side control signal used for learning based on the reference characteristic.

Also as stated above, Kowatari fails to disclose the calculating step further comprises when the learning control mode is selected:

5) detecting pressures generated from the proportional electromagnetic valve when the proportional electromagnetic valve is driven with the minimum-displacement-side control signal and the maximum- displacement-side control signal as first and second measured pressures, respectively;

6) calculating, based on a relationship between the minimum- displacement-side and maximum-displacement-side control signals and the first and second measured pressures, a minimum displacement control signal for causing the proportional electromagnetic valve to generate a displacement control pressure corresponding to a minimum displacement angle, and a maximum displacement control signal for causing the proportional electromagnetic valve to generate a displacement control pressure corresponding to a maximum displacement angle;

7) calculating a first difference between the minimum displacement control signal and the minimum-displacement-side control signal used for learning, and a second difference between the maximum displacement control signal and the maximum-displacement-side control signal used for learning;

the calculating step further comprises when the control mode is selected:

8) calculating a correction amount corresponding to the second difference based on the reference characteristic, the first and second differences and the displacement command,

9) correcting with the correction amount the displacement control signal calculated in the calculating step based on the displacement command referring to the reference characteristic, with the correction amount.

Collins et al. discloses a method for calibrating hydraulic actuator with the calculating step comprising:

5) detecting pressures generated from the proportional electromagnetic valve when the proportional electromagnetic valve is driven with the minimum-displacement-side control signal and the maximum- displacement-side control signal as first and second measured pressures, respectively *(Collins, column 4, lines 53-65; the actuator 14 being measured is the proportional electromagnetic valve, e.g., [93.33 psi] is the pressure detected with the minimum-side displacement control signal, e.g., [93.33 psi] is the first measured pressure , e.g., [84.88 psi] is the pressure detected with the maximum-side displacement control signal, e.g., [84.88 psi] is the second measured pressure; NOTE: the detected first measured pressure is perform in module assembly 26 [see column 4, lines 53-54], 93.33 is just an example arbitrary pressure that corresponds to the minimum-side displacement control signal that is applied to the module assembly 26 [see column 4, lines 55-58]; see also column 2, lines 4-11)*;

6) calculating, based on a relationship between the minimum- displacement-side and maximum-displacement-side control signals and the first and second measured pressures, a minimum displacement control signal for causing the proportional electromagnetic valve to generate a displacement control pressure corresponding to a minimum displacement angle, and a maximum displacement control signal for causing the proportional electromagnetic valve to generate a displacement control pressure corresponding to a maximum displacement angle *(Collins, column 3, lines 26-33; Collins does not explicitly disclose the min or max control signal is calculated based on the pressure, however, since the relationship is known and one would be able to calculate the signal based on the pressure)*;

7) calculating a first difference between the minimum displacement control signal and the minimum-displacement-side control signal used for learning, and a second difference between the maximum displacement control signal and the maximum-displacement-side control signal used for learning *(Collins, column 4, lines 58-61; the +/-0.1 is the learn value; the first and second difference is determined in step 62)*.

The examiner acknowledged that the invention taught by Collins is not directed to an electromagnetic proportional valve. It's only Collins' calibration method being used as a generic teaching of a well known calibration method; as such, Collins' calibration method could be used in any device, e.g., electromagnetic proportional valve.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use the <u>above</u> calibration method <u>[5, 6 and 7]</u> as taught by

Collins <u>when the learning mode is selected</u> such that the tolerance of the module assemblies *(the Hydraulic pump control system of Kowatari)* are reduced and the performance is increased *(Collins, column 5, lines 14-18))*.

Collins also discloses

8) **<u>calculating a correction amount corresponding to the second difference based on the reference characteristic, the first and second differences and the displacement command,</u>** ***(Collins, column 4, line 66 to column 5, line 6; the first and second differences is determined in step 62 <u>of figure 4</u>, and the correction amount is inherently calculated before the actuator is adjusted within the specific windows)*; and**

9) correcting with the correction amount the displacement control signal calculated in the calculating step based on the displacement command referring to the reference characteristic, with the correction amount *(Collins, column 4, line 66 to column 5, line 6; the specified windows is the required displacement control pressure, adjusted means correcting).*

The examiner acknowledged that the invention taught by Collins is not directed to an electromagnetic proportional valve. It's only Collins' calibration method being used as a generic teaching of a well known calibration method; as such, Collins' calibration method could be used in any device, e.g., electromagnetic proportional valve.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use the <u>above</u> calibration method <u>[8 and 9]</u> as taught by Collins

<u>when the control mode is selected</u> such that the tolerance of the module assemblies *(the Hydraulic pump control system of Kowatari)* are reduced and the performance is increased *(Collins, column 5, lines 14-18))*.

NOTE for step 8: Collins is silent as to using the first and second differences, **the reference characteristic and the displacement command** to calculate the correction amount. However, when the Collin's calibration is applied to Kowatari, it would be obvious to use the reference characteristic *(Kowatari, column 10, lines 54-58, figure 6 and 7 shows the reference characteristic)* that corresponds to a particular device along with the displacement command *(the tilting θ)* because the correction value would be more reliable when the reference characteristic is used.

Regarding claims 19 and 20, Kowatari does not disclose when detecting the first measured pressure, the displacement control signal is increased from a minimum displacement so as to set the minimum- displacement-side control signal for learning, for use in detection of the first measured pressure; and when detecting the second measured pressure, the displacement control signal is reduced from a maximum displacement so as to set the maximum- displacement-side control signal for learning, for use in detection of the second measured pressure..

Collins discloses when detecting the first measured pressure, the displacement control signal is increased from a minimum displacement so as to set the minimum-displacement-side control signal for learning, for use in detection of the first measured pressure; and when detecting the second measured pressure, the displacement control

signal is reduced from a maximum displacement so as to set the maximum-displacement-side control signal for learning, for use in detection of the second measured pressure *(Collins, column 4, lines 53-65; the detecting of the first and second measured pressure is performed at step 60; column 1, lines 56-64, the signal is swept from min to max and from max to min).*

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use the calibration method as taught by Collins so that every measurement value of a electromagnetic value is recorded during sweeping and such sweeping method would provided a better resolution of data which results a more accurate calibration.

Regarding claim 23 and 24, Kowatari discloses a construction machine, comprising a displacement control device according to claims 21 and 22 *(column 8, lines 50-63 "a working machine such as a hydraulic excavator").*

Regarding claims 25 and 26, Kowatari does not disclose the invention as claimed.

Collins discloses

1) the calculating step further comprises when the learning control mode is selected:

generating a correction characteristic representing a relationship between a correction pressure and a displacement command, based on the first difference and the second difference and the minimum-side displacement corresponding to the first measured pressure and the maximum-side displacement corresponding to the second measured pressure *(Collins, column 4, lines 58-61; the +/-0.1 is the learn value; the first and second difference is determined in step 62, see also column 4, Table 3 is the correction characteristic, the current is the displacement command; further see column 4: lines 66 to column 5: line 6, the correction characteristic would change and saved with new value of the correction characteristic as the learning process continue)*,

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use the calibration method as taught by Collins <u>when the learning control mode is selected</u> such that the tolerance of the module assemblies *(the Hydraulic pump control system of Kowatari)* are reduced and the performance is increased *(Collins, column 5, lines 14-18))*.

Collins also disclose

2) in the calculating step when the normal control mode is selected:

in response to the operator-generated displacement command, **a correction pressure is calculated as the correction amount based on the correction characteristic** and the operator-generated displacement command, the required displacement control pressure required to provide a displacement angle corresponding to the operator-generated displacement command is corrected with the

correction pressure *(Collins, column 4, line 66 to column 5, line 6; the first and second differences is determined in step 62, and the correction amount is inherently calculated before the actuator is adjusted within the specific windows).*

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to use the calibration method as taught by Collins <u>when the normal control mode is selected</u> such that the tolerance of the module assemblies *(the Hydraulic pump control system of Kowatari)* are reduced and the performance is increased *(Collins, column 5, lines 14-18))*.

Note: When the calibration is applied to Kowatari's learning mode, the tilting angle θ (corresponds to control signal *i*) of Kowatari would be the operator-generated displacement command. The correction pressure of the hydraulic device would uses the Collins' calibration and the displacement angle θ (corresponds to control signal *i*) will be apply to Collins' method (e.g., in place of the current in table 3) and the displacement control pressure is corrected.

Response to Arguments

4. Applicant's arguments filed 03/04/2010 have been fully considered but they are not persuasive.

The applicants argue that the primary reference Kowatari uses a displacement angle sensor for calibration but the invention of the instant application "compensate for variations in proportional electromagnetic valves outputs *without using a displacement angle sensor*" (see page 15 of the filed RCE).

The Examiner agrees with the argument made by the applicants. However, the claimed invention does not limit the invention from NOT using the displacement angle sensor.

Conclusion

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Manko Cheung whose telephone number is (571) 270-7917. The examiner can normally be reached on Mon-Thur 9:30-16:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew A. Dunn can be reached on (571) 272-2312. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/M.C./
May 5, 2010

Drew A. Dunn
/Drew A. Dunn/
Supervisory Patent Examiner, Art Unit 2863